



## **QUARTERLY GROUNDWATER MONITORING REPORT**

**Second Quarter 2005 (Twelfth Quarterly)**

**Sampled on May 14, 2005**

**Job # SP-110**

**LOP # 12509**

June 28, 2005

**Big Oil & Tire – Blue Lake BP (Blue Lake 76)**

291 Blue Lake Boulevard  
Blue Lake, California 95525

This *Quarterly Groundwater Monitoring Report* was prepared for Big Oil & Tire Co. (BO&T) by SounPacific Staff using previous studies that were provided by Clearwater Group, Inc. (CGI) and file review conducted at Humboldt County Division of Environmental Health (HCDEH). The site is located at 291 Blue Lake Boulevard, Blue Lake, California (Figure 1).

### **SITE DESCRIPTION**

The site is surfaced around the current structure with concrete and asphalt. Site improvements include a single story building with an attached warehouse and three dispenser islands. The primary building is used as a mini-mart and the warehouse is used for storage. An apartment building is located adjacent to the north of the mini-mart. The main structures are positioned on the northern property line with the entrance to the mini-mart facing south towards Blue Lake Boulevard (Figure 2).

There is currently one 12,000-gallon regular unleaded gasoline UST and one 12,000-gallon split-

compartment UST containing premium unleaded gasoline and diesel fuel, which were installed on March 24, 2004 (Figure 2). Three (3) 5,000-gallon underground storage tanks (USTs) that contained regular unleaded gasoline, mid-grade unleaded gasoline, and diesel fuel, and a 2,000-gallon UST that contained premium unleaded gasoline were removed from the site on March 19, 2004. Surface water runoff is controlled by drainage ditches and municipal storm sewers. All electrical and telephone lines are positioned above the ground surface (Figure 2).

## **SITE TOPOGRAPHY AND LAND USE**

The elevation of the site is approximately 125 feet above mean sea level (amsl). The site and surrounding properties slope gently in a south and westerly direction toward the Mad River, which is located approximately one mile south of the site. Surface water appears to drain in a southerly direction. Surrounding topography rises steeply to the north (Figure 1). The surrounding land use in the immediate vicinity is a mixture of commercial and residential. The Blue Lake Burger Barn resides adjacent and to the east of the site. Blue Lake Boulevard borders the south side of the property line. Elgar's Apartments is adjacent to the west of the site. Residential properties are located to the south of the property.

## **RESULTS OF QUARTERLY SAMPLING**

A quarterly groundwater monitoring program was implemented by SounPacific on July 15, 2002 and will continue until further notice. SounPacific staff is currently conducting quarterly groundwater sampling events to monitor hydrocarbon concentrations on site, and collecting quarterly water level data to document any changes in groundwater levels and track any noticeable changes in groundwater gradient and direction of flow. Monitoring wells were gauged and sampled on May 14, 2005.

### **FIELD DATA**

**Wells gauged:** MW-2, MW-3, and MW- 4

**Groundwater:** Ranged from 113.73 to 116.87 feet above mean sea level (Figure 1)

**Floating Product:** Sheen detected MW-3 and MW-4 and in the disused domestic well DW-1

**Flow direction:** SSW

**Groundwater gradient:** 0.08 feet per foot (ft/ft) (Figure 3)

On May 14, 2005, the depth to groundwater in the site's three monitoring wells ranged from 8.04 feet below top of casing (btoc) in well MW-2 to 10.34 feet btoc in MW-4. When corrected to mean sea-level, water level elevations ranged from 113.73 feet above mean sea-level (amsl) in MW-4 to 116.87 feet amsl in MW-2. Groundwater levels for the May 14, 2005 monitoring event, along with historical level and elevations are included in Table 1. Groundwater flow was towards the south-southwest at a gradient of 0.08 feet per foot. The groundwater flow and gradient are graphically depicted in Figure 3. Prior to sampling, all wells were purged; the groundwater field purging parameters for each well are presented below.

#### **MONITORING WELL MW-2 GROUNDWATER FIELD PARAMETERS**

<b>Time</b>	<b>Total Vol. Removed/ gal</b>	<b>pH</b>	<b>Temp./ F</b>	<b>Cond./ ms(cm)<sup>-1</sup></b>
4:00	0	7.16	59.55	0.155
4:04	1.6	7.07	58.83	0.156
4:08	3.2	7.02	58.90	0.154
4:10	4.8	7.03	59.02	0.151

### **MONITORING WELL MW-3 GROUNDWATER FIELD PARAMETERS**

<b>Time</b>	<b>Total Vol. Removed/ gal</b>	<b>pH</b>	<b>Temp./ F</b>	<b>Cond./ ms(cm)<sup>-1</sup></b>
2:41	0	7.23	59.95	0.219
2:47	1.75	7.12	60.04	0.220
2:51	3.5	7.03	60.01	0.229
2:54	5.25	7.01	60.25	0.221

### **MONITORING WELL MW-4 GROUNDWATER FIELD PARAMETERS**

<b>Time</b>	<b>Total Vol. Removed/ gal</b>	<b>pH</b>	<b>Temp./ F</b>	<b>Cond./ ms(cm)<sup>-1</sup></b>
3:23	0	6.95	61.91	0.610
3:26	1.5	6.89	61.79	0.575
3:30	3.0	6.89	61.90	0.581
3:33	4.5	6.95	62.18	0.596

### **ANALYTICAL RESULTS**

**Sampling locations:** MW-2, MW-3, and MW- 4

**Analyses performed:** TPHg, BTXE, MTBE, DIPE, TAME, ETBE, TBA, TPHd, TPHmo

**Laboratories Used:** Basic Labs, Redding, California

On May 14, 2005, the three on-site monitoring wells were sampled for laboratory analysis. In wells MW-2, MW-3, and MW-4, groundwater samples for analysis were collected following suitable well purging. Well purging has never been conducted for the disused “domestic well” (DW-1) prior to sampling. Therefore, until the domestic well is properly purged, future groundwater samples will not be collected from this location. The analytical results for the current monitoring event are presented on the next page and graphically depicted in Figure 4. The laboratory report is included as Appendix A. The historical analytical results for all monitoring wells, since the implementation of groundwater monitoring are included as Table 2.

	<u><b>MW-2</b></u> <b>(ppb)</b>	<u><b>MW-3</b></u> <b>(ppb)</b>	<u><b>MW-4</b></u> <b>(ppb)</b>
<b>TPHg:</b>	ND < 50	ND < 50	ND < 50
<b>Benzene:</b>	ND < 0.5	ND < 0.5	ND < 0.5
<b>Toluene:</b>	ND < 0.5	ND < 0.5	ND < 0.5
<b>Xylenes:</b>	ND < 1.0	ND < 1.0	ND < 1.0
<b>Ethylbenzene:</b>	ND < 0.5	ND < 0.5	ND < 0.5
<b>MTBE:</b>	ND < 1.0	ND < 1.0	<b>12.2</b>
<b>DIPE:</b>	ND < 0.5	ND < 0.5	ND < 0.5
<b>TAME:</b>	ND < 0.5	ND < 0.5	ND < 0.5
<b>ETBE:</b>	ND < 0.5	ND < 0.5	ND < 0.5
<b>TBA:</b>	ND < 50	ND < 50	ND < 50
<b>TPHd:</b>	<b>55</b>	ND < 50	ND < 50
<b>TPHmo:</b>	<b>61</b>	ND < 50	ND < 50

(ND= non-detectable)

## **COMMENTS AND RECOMMENDATIONS**

On May 14, 2005, the 12th groundwater monitoring event for the three on-site monitoring wells was conducted at the Blue Lake 76 service station at 291 Blue Lake Boulevard in Blue Lake, California. A summary of the results are presented below.

- The depth to groundwater in the three onsite wells ranged between 8.04 feet btoc (MW-2) to 10.34 feet btoc (MW-4). When corrected to sea-level, the water level elevation ranged from 113.73 feet above mean sea-level (amsl) in MW-4 to 116.87 feet amsl in MW-2. Groundwater flow was towards the South-Southwest at a gradient of 0.08 feet per foot.
- Groundwater samples from the three on-site wells were collected and analyzed for TPHg, BTXE, five-fuel oxygenates, TPHd, and TPHmo. MTBE was reported in well MW-4 at a concentration of 12.2 ppb. No other fuel oxygenates were reported in any

of the wells. TPHd was reported in well MW-2 at a concentration of 55 ppb; however, the sample chromatogram for MW-4 did not match the standard diesel chromatogram. TPHmo was reported at a concentration of 61 ppb in MW-2.

Based upon these results the following observations and conclusions have been made.

- TPHg has consistently been present and is restricted to wells MW-4 and DW-1. TPHg was consistently present in well MW-1, prior to its abandonment. TPHg was detected once in well MW-2 during the first quarter 2004 monitoring event. The historical fluctuations of TPHg concentrations over time for all wells are shown in Figures 5, 6, 8 and 9.
- BTXE has never been detected in wells MW-2 and MW-3. With the exception of low levels of xylenes and ethylbenzene during the previous monitoring event (October 2004), BTXE concentrations have been non-detect in well MW-4 since the second quarter of 2003. In the disused domestic well, concentrations of BTXE have generally shown a reduction over time. See Figures 5 through 9.
- MTBE is present in all wells at the site. In wells MW-2 and MW-3, MTBE concentrations have reported consistent low levels historically and, during the last two events, were non-detect since the first quarterly sampling event. MTBE concentrations have generally decreased in wells MW-4 since the inception of the monitoring. Domestic well DW-1 continues to report MTBE at significantly high levels, although levels have been decreasing during recent monitoring events, see Figures 5 through 9.
- TAME has been reported, at low levels, in three of the twelve sampling events in well MW-2, but has not been reported since October 2002. In well MW-3 TAME has never been reported. In well MW-4, TAME was reported during seven of the last twelve sampling events at low levels.
- TBA was reported once during the first quarter of 2003 in monitoring well MW-4 (12 ppb).

- TPHd was detected for the fourth time in well MW-2 during the last monitoring event. TPHd was detected once in well MW-3 during the well installation sampling event and in well MW-4 the concentrations of TPHd have fluctuated over time. The disused domestic well (DW-1) has reported consistent elevated concentrations (average of 2,000 ppm) of TPHd since the implementation of sampling. The historical fluctuations of TPHd concentrations over time for all wells are shown in Figures 5 through 9.
- TPHmo was detected for the second time in well MW-2, during this monitoring event. However, it should be noted that a reporting limit, lower than used during previous monitoring events was used during the past two monitoring events.
- High concentrations of petroleum hydrocarbons have continuously been reported in the grab groundwater samples collected from the disused well DW-1. These levels are uncharacteristic with the contaminant levels throughout the remained of the site; hence it is suspected that the reported petroleum hydrocarbons may have originated from a source other than the Blue Lake 76 site. However, no other source is known. It is therefore concluded that further evaluation of the petroleum hydrocarbons in well DW-1, are required prior to conducting any further delineation studies.

Based on the results of the May 2005 monitoring event, data interpretation, and historical results, the following future activities are proposed.

- Groundwater monitoring will be continued until further notice. Groundwater level measurements will be collected from the three on-site monitoring wells to determine groundwater flow direction and gradient. Groundwater sampling and analysis will be conducted from the three on-site wells and one off-site domestic well. Collected groundwater samples from all the wells will be analyzed for TPHg, BTXE, five-fuel oxygenates/additives, TPHd, and TPHmo.
- Due to the high concentrations that have continuously been reported in the grab

groundwater samples collected from the disused well DW-1, which are uncharacteristic with the contaminant levels throughout the remainder of the site, it has been suspected that the reported petroleum hydrocarbons may have originated from another source. It is therefore proposed to purge the well a minimum of at least two well volumes and allow it to recover to its pre-purge water level, prior to sampling. Based on the limited known information, i.e. diameter, depth, on the construction of the well, it is expected that purging will require the removal of approximately 600-gallons of water. Once the purging has been completed and the water level in the well has recovered to a minimum of 90% of its original level, groundwater samples will be collected for analysis. The collected sample will be analyzed for the compounds stated above. If resulting levels remain elevated, it will be interpreted that the levels in the well are characteristic of the surrounding groundwater quality, however, if contaminant levels are lower and have similar characteristic to the contamination throughout the remainder of the site, it will be assumed that the contamination previously identified in the well did originate from the Blue Lake 76 site.

SounPacific recommended the placement of an onsite 1,000 gallon tank to contain the purge water from the domestic well until disposal can be obtain from current analytical. This was discussed and requested in the last quarterly but SounPacific has not received written correspondence regarding our previous recommendations. It is expected that this work will be conducted after a written approval response is received from HCDEH. Once written approval is granted, the results of the work will be incorporated into the next groundwater monitoring report.

- The preparation of the requested Subsurface Investigation Workplan will be suspended at the current time to await the results of the purging, sampling, and analysis of the disused domestic well DW-1. Once this data has been obtained and evaluated, the Workplan aimed at delineating the groundwater plume at the site will be prepared. Once written approval is granted, it is expected that the requested Work Plan will be submitted within 30days of this written correspondence.

## CERTIFICATION

This report was prepared under the direct supervision of a California registered geologist at SounPacific. All information provided in this report including statements, conclusions and recommendations are based solely upon field observations and analyses performed by a state-certified laboratory. SounPacific is not responsible for laboratory errors.

SounPacific promises to perform all its work in a manner that is currently used by members in similar professions working in the same geographic area. SounPacific will do whatever is reasonable to ensure that data collection is accurate. Please note however, that rain, buried utilities, and other factors can influence groundwater depths, directions and other factors beyond what SounPacific could reasonably determine.

### **SounPacific**

Prepared by:



Greg Sounheim, REA # 07994

Project Manager



Reviewed by:



Michael Sellens, RG # 4714, REA # 07888

Principal Geologist



## **ATTACHMENTS**

### **TABLES & CHARTS**

Table 1: Water Levels

Table 2: Groundwater Analytical Results

Chart 1: Hydrograph

### **FIGURES**

Figure 1: Aerial / Topo Map

Figure 2: Site Plan

Figure 3: Groundwater Gradient Map May 2005

Figure 4: Groundwater Analytical Results

Figure 5: MW-1 Hydrocarbon Concentrations vs. Time

Figure 6: MW-2 Hydrocarbon Concentrations vs. Time

Figure 7: MW-3 Hydrocarbon Concentrations vs. Time

Figure 8: MW-4 Hydrocarbon Concentrations vs. Time

Figure 9: DW-1 Hydrocarbon Concentrations vs. Time

### **APPENDICES**

Appendix A: Laboratory Report and Chain-of-Custody Form

Appendix B: Standard Operating Procedures

Appendix C: Field Notes

## **Tables & Chart**

**Table 1**  
**Water Levels**

Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

Sample Location	Date	Depth to Bottom/ Feet BGS	Survey Height/ Feet Above MSL	Depth to Water/ Feet BGS	Adjusted Elevation/ Feet Above MSL	Thickness of Floating Product / Feet
MW-1	5/19/2002	15.26	125.50	8.35	117.15	0.00
	6/16/2002	15.26	125.50	8.62	116.88	0.00
	7/16/2002	15.30	125.50	8.98	116.52	0.00
	8/19/2002	15.25	125.50	9.43	116.07	0.00
	9/11/2002	15.31	125.50	9.57	115.93	0.00
	10/14/2002	15.26	125.50	9.59	115.91	0.00
	11/15/2002	15.29	125.50	8.95	116.55	0.00
	12/16/2002	15.24	125.50	7.82	117.68	0.00
	1/16/2003	15.29	125.50	8.11	117.39	0.00
	2/14/2003	15.30	125.50	8.15	117.35	0.00
	3/12/2003	15.28	125.50	8.13	117.37	0.00
	4/13/2003	15.21	125.50	8.12	117.38	0.00
	7/13/2003	19.12	125.50	8.99	116.51	0.00
	10/22/2003	15.21	125.50	9.11	116.39	0.00
	1/26/2004	15.21	125.50	8.14	117.36	0.00
MW-2	5/19/2002	18.24	124.91	8.72	116.19	0.00
	6/16/2002	18.24	124.91	9.09	115.82	0.00
	7/16/2002	18.21	124.91	9.48	115.43	0.00
	8/19/2002	18.18	124.91	9.61	115.30	0.00
	9/11/2002	18.24	124.91	9.63	115.28	0.00
	10/14/2002	18.21	124.91	9.66	115.25	0.00
	11/15/2002	18.22	124.91	8.72	116.19	0.00
	12/16/2002	18.19	124.91	6.93	117.98	0.00
	1/16/2003	18.23	124.91	7.34	117.57	0.00
	2/14/2003	18.25	124.91	8.07	116.84	0.00
	3/12/2003	18.22	124.91	8.20	116.71	0.00
	4/13/2003	18.15	124.91	8.05	116.86	0.00
	7/13/2003	18.11	124.91	9.20	115.71	0.00
	10/22/2003	18.11	124.91	9.18	115.73	0.00
	1/26/2004	18.11	124.91	7.34	117.57	0.00
	7/31/2004	18.40	124.91	9.85	115.06	0.00
	10/31/2004	18.13	124.91	8.32	116.59	0.00
	1/29/2005	18.41	124.91	7.31	117.60	0.00
	5/14/2005	18.16	124.91	8.04	116.87	0.00

**Table 1 (cont.)**  
**Water Levels**

Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

Sample Location	Date	Depth to Bottom/ Feet BGS	Survey Height/ Feet Above MSL	Depth to Water/ Feet BGS	Adjusted Elevation/ Feet Above MSL	Thickness of Floating Product / Feet
MW-3	5/19/2002	18.98	125.26	8.77	116.49	0.00
	6/16/2002	18.98	125.26	9.09	116.17	0.00
	7/16/2002	18.98	125.26	10.55	114.71	0.00
	8/19/2002	18.97	125.26	13.65	111.61	0.00
	9/11/2002	18.99	125.26	14.65	110.61	0.00
	10/14/2002	18.97	125.26	15.47	109.79	0.00
	11/15/2002	19.01	125.26	10.62	114.64	0.00
	12/16/2002	19.25	125.26	9.69	115.57	0.00
	1/16/2003	19.00	125.26	8.44	116.82	0.00
	2/14/2003	19.00	125.26	8.56	116.70	0.00
	3/12/2003	19.05	125.26	8.10	117.16	0.00
	4/13/2003	18.91	125.26	8.06	117.20	0.00
	7/13/2003	19.18	125.26	9.11	116.15	0.00
	10/22/2003	19.18	125.26	15.12	110.14	0.00
	1/26/2004	19.18	125.26	8.93	116.33	0.00
	7/31/2004	19.18	125.26	12.47	112.79	0.00
	10/31/2004	19.20	125.26	9.70	115.56	0.00
	1/29/2005	19.21	125.26	8.91	116.35	0.00
	5/14/2005	19.25	125.26	8.53	116.73	0.00
MW-4	5/19/2002	19.17	124.07	10.80	113.27	0.00
	6/16/2002	19.18	124.07	10.32	113.75	0.00
	7/16/2002	19.18	124.07	10.39	113.68	0.00
	8/19/2002	19.17	124.07	10.39	113.68	0.00
	9/11/2002	19.21	124.07	10.67	113.40	0.00
	10/14/2002	19.17	124.07	10.52	113.55	0.00
	11/15/2002	19.20	124.07	10.21	113.86	0.00
	12/16/2002	19.47	124.07	9.96	114.11	0.00
	1/16/2003	19.21	124.07	9.98	114.09	0.00
	2/14/2003	19.19	124.07	10.82	113.25	0.00
	3/12/2003	19.27	124.07	10.37	113.70	0.00
	4/13/2003	19.11	124.07	9.91	114.16	0.00
	7/13/2003	19.39	124.07	10.67	113.40	0.00
	10/22/2003	19.39	124.07	10.73	113.34	0.00
	1/26/2004	19.39	124.07	10.95	113.12	0.00
	4/28/2004	19.39	124.07	10.65	113.42	0.00
	7/31/2004	19.38	124.07	10.75	113.32	0.00
	10/31/2004	19.39	124.07	10.79	113.28	0.00
	1/29/2005	19.42	124.07	9.90	114.17	0.00
	5/14/2005	19.43	124.07	10.34	113.73	0.00

Notes:  
Bgs: Below Ground Surface  
MSL: Mean Sea Level

**Table 2**  
**Quarterly Groundwater Analytical Results**  
Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

Sample Location	Sample Event	Annual Quarter	Sample Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Xylenes (ppb)	Ethylbenzene (ppb)	MTBE (ppb)	DIPE (ppb)	TAME (ppb)	ETBE (ppb)	TBA (ppb)	TPHd (ppb)	TPHmo (ppb)	EDB (ppb)	EDC (ppb)
MW-1	Well Installation	2nd Quarter	5/19/2002	1,220	19.1	2.7	29.1	48	242	ND < 0.5	ND < 0.5	ND < 0.5	ND < 40	464	ND < 50	ND < 0.5	ND < 0.5
	1st Quarterly	3rd Quarter	7/16/2002	225	2.6	0.6	1.0	2.0	227	ND < 0.5	9.2	ND < 0.5	ND < 100	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	2nd Quarterly	4th Quarter	10/14/2002	ND < 1,000	ND < 6.0	ND < 6.0	ND < 6.0	ND < 6.0	151	ND < 10	ND < 10	ND < 10	ND < 2,000	ND < 50	ND < 50	ND < 10	ND < 10
	3rd Quarterly	1st Quarter	1/16/2003	6,500	45	7.4	42.8	100	400	ND < 5.0	9.3	ND < 5.0	500	750	ND < 500	ND < 5.0	ND < 5.0
	4th Quarterly	2nd Quarter	4/13/2003	3,000	14	ND < 5.0	6.3	28	210	ND < 5.0	ND < 5.0	ND < 5.0	ND < 50	300	ND < 500	----	----
	5th Quarterly	3rd Quarter	7/13/2003	450	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	210	ND < 0.5	5.1	ND < 0.5	130	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	6th Quarterly	4th Quarter	10/22/2003	180	ND < 5.0	ND < 5.0	ND < 10.0	ND < 5.0	110	ND < 5.0	ND < 5.0	ND < 5.0	79	ND < 50	ND < 500	ND < 5.0	ND < 5.0
	7th Quarterly	1st Quarter	1/26/2004	1,400	25	ND < 5.0	7.1	39	86	ND < 5.0	ND < 5.0	ND < 5.0	ND < 50	ND < 50	ND < 500	ND < 5.0	ND < 5.0
MW-2	Well Installation	2nd Quarter	5/19/2002	ND < 50	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	37.2	ND < 0.5	1.6	ND < 0.5	ND < 40	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	1st Quarterly	3rd Quarter	7/16/2002	ND < 50	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	47.6	ND < 0.5	1.1	ND < 0.5	ND < 100	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	2nd Quarterly	4th Quarter	10/14/2002	ND < 50	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	19.2	ND < 0.5	0.8	ND < 0.5	ND < 100	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	1/16/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	3.2	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	4th Quarterly	2nd Quarter	4/13/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	3.8	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	----	----
	5th Quarterly	3rd Quarter	7/13/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	3.7	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	6th Quarterly	4th Quarter	10/22/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	2.1	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	7th Quarterly	1st Quarter	1/26/2004	85	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	0.7	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	9th Quarterly	3rd Quarter	7/31/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	1.6	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	87	ND < 500	----	----
	10th Quarterly	4th Quarter	10/31/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1.5	ND < 0.5	0.8	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	96	ND < 500	----	----
	11th Quarterly	1st Quarter	1/29/2005	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	ND < 1.0	ND < 0.5	ND < 5.0	ND < 5.0	ND < 50	67	99	----	----
	12th Quarterly	2nd Quarter	5/14/2005	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	ND < 1.0	ND < 0.5	ND < 0.5	ND < 0.5	ND < 50	55	61	----	----
MW-3	Well Installation	2nd Quarter	5/19/2002	ND < 50	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	ND < 2.0	ND < 0.5	ND < 0.5	ND < 0.5	ND < 40	440	ND < 50	ND < 0.5	ND < 0.5
	1st Quarterly	3rd Quarter	7/16/2002	ND < 50	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	2.1	ND < 0.5	ND < 0.5	ND < 0.5	ND < 100	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	2nd Quarterly	4th Quarter	10/14/2002	ND < 50	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	2.1	ND < 0.5	ND < 0.5	ND < 0.5	ND < 100	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	1/16/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	7.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	4th Quarterly	2nd Quarter	4/13/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	0.7	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	----	----
	5th Quarterly	3rd Quarter	7/13/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	0.6	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	6th Quarterly	4th Quarter	10/22/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	2.3	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	7th Quarterly	1st Quarter	1/26/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	0.9	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	9th Quarterly	3rd Quarter	7/31/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	1.2	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	----	----
	10th Quarterly	4th Quarter	10/31/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1.5	ND < 0.5	1.1	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	----	----
	11th Quarterly	1st Quarter	1/29/2005	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	ND < 1.0	ND < 0.5	ND < 5.0	ND < 5.0	ND < 50	ND < 50	ND < 50	----	----
	12th Quarterly	2nd Quarter	5/14/2005	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	ND < 1.0	ND < 0.5	ND < 0.5	ND < 0.5	ND < 50	ND < 50	ND < 50	----	----

**Table 2 (cont.)**  
**Quarterly Groundwater Analytical Results**  
Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

Sample Location	Sample Event	Annual Quarter	Sample Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Xylenes (ppb)	Ethylbenzene (ppb)	MTBE (ppb)	DIPE (ppb)	TAME (ppb)	ETBE (ppb)	TBA (ppb)	TPHd (ppb)	TPHmo (ppb)	EDB (ppb)	EDC (ppb)
MW-4	Well Installation	2nd Quarter	5/19/2002	2,450	4.6	2.2	236	154	107	ND < 0.5	ND < 0.5	ND < 0.5	ND < 40	363	ND < 50	ND < 0.5	ND < 0.5
	1st Quarterly	3rd Quarter	7/16/2002	1,070	ND < 6.0	ND < 6.0	26.3	81.8	141	ND < 10	ND < 10	ND < 10	ND < 2,000	ND < 50	ND < 50	ND < 10	ND < 10
	2nd Quarterly	4th Quarter	10/14/2002	535	2.0	ND < 0.3	ND < 0.6	1.8	73.6	ND < 0.5	5.0	ND < 0.5	ND < 100	538	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	1/16/2003	260	0.6	ND < 0.5	ND < 1.0	ND < 0.5	100	ND < 0.5	3.0	ND < 0.5	12	53	ND < 500	ND < 0.5	ND < 0.5
	4th Quarterly	2nd Quarter	4/13/2003	66	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	25	ND < 0.5	0.7	ND < 0.5	ND < 5.0	ND < 50	ND < 500	----	----
	5th Quarterly	3rd Quarter	7/13/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	17	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	6th Quarterly	4th Quarter	10/22/2003	430	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	68	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	76	ND < 500	ND < 0.5	ND < 0.5
	7th Quarterly	1st Quarter	1/26/2004	71	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	22	ND < 0.5	0.8	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	8th Quarterly	2nd Quarter	4/28/2004	51	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	15	ND < 0.5	0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	9th Quarterly	3rd Quarter	7/31/2004	140	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	28	ND < 0.5	1.4	ND < 0.5	ND < 5.0	110	ND < 500	----	----
	10th Quarterly	4th Quarter	10/31/2004	100	ND < 0.5	ND < 0.5	1.3	0.5	76	ND < 0.5	3.5	ND < 0.5	ND < 5.0	82	ND < 500	----	----
	11th Quarterly	1st Quarter	1/29/2005	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	23.3	ND < 0.5	ND < 5.0	ND < 5.0	ND < 50	ND < 50	ND < 50	----	----
	12th Quarterly	2nd Quarter	5/14/2005	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	12.2	ND < 0.5	ND < 0.5	ND < 0.5	ND < 50	ND < 50	ND < 50	----	----
Domestic Well	Well Installation	2nd Quarter	5/19/2002	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	1st Quarterly	3rd Quarter	7/16/2002	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	2nd Quarterly	4th Quarter	10/14/2002	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	3rd Quarterly	1st Quarter	1/16/2003	16,000	39	11	460	130	180	----	----	----	----	2,500	----	----	----
	4th Quarterly	2nd Quarter	4/13/2003	4,200	25	5.1	239	31	130	----	----	----	----	2,200	----	----	----
	5th Quarterly	3rd Quarter	7/13/2003	10,000	46	10	416	190	480	----	----	----	----	3,200	----	----	----
	6th Quarterly	4th Quarter	10/22/2003	5,200	29	ND < 5.0	218	39	880	----	----	----	----	1,200	----	----	----
	7th Quarterly	1st Quarter	1/26/2004	5,500	19	ND < 5.0	152	ND < 5.0	79	----	----	----	----	ND < 50	----	----	----
	8th Quarterly	2nd Quarter	4/28/2004	7,300	21	ND < 5.0	128	55	100	----	----	----	----	3,000	----	----	----
	9th Quarterly	3rd Quarter	7/31/2004	5,200	23	3.9	168	55	580	----	----	----	----	3,300	----	----	----
	10th Quarterly	4th Quarter	10/31/2004	4,400	25	5.0	175	50	160	ND < 5.0	ND < 5.0	5.8	ND < 50	2,300	ND < 500	----	----
	11th Quarterly	1st Quarter	1/29/2005	1,120	9.3	2.2	53.5	32.0	47.5	ND < 0.5	ND < 5.0	ND<5.0	ND<50	1,780	ND < 50	----	----

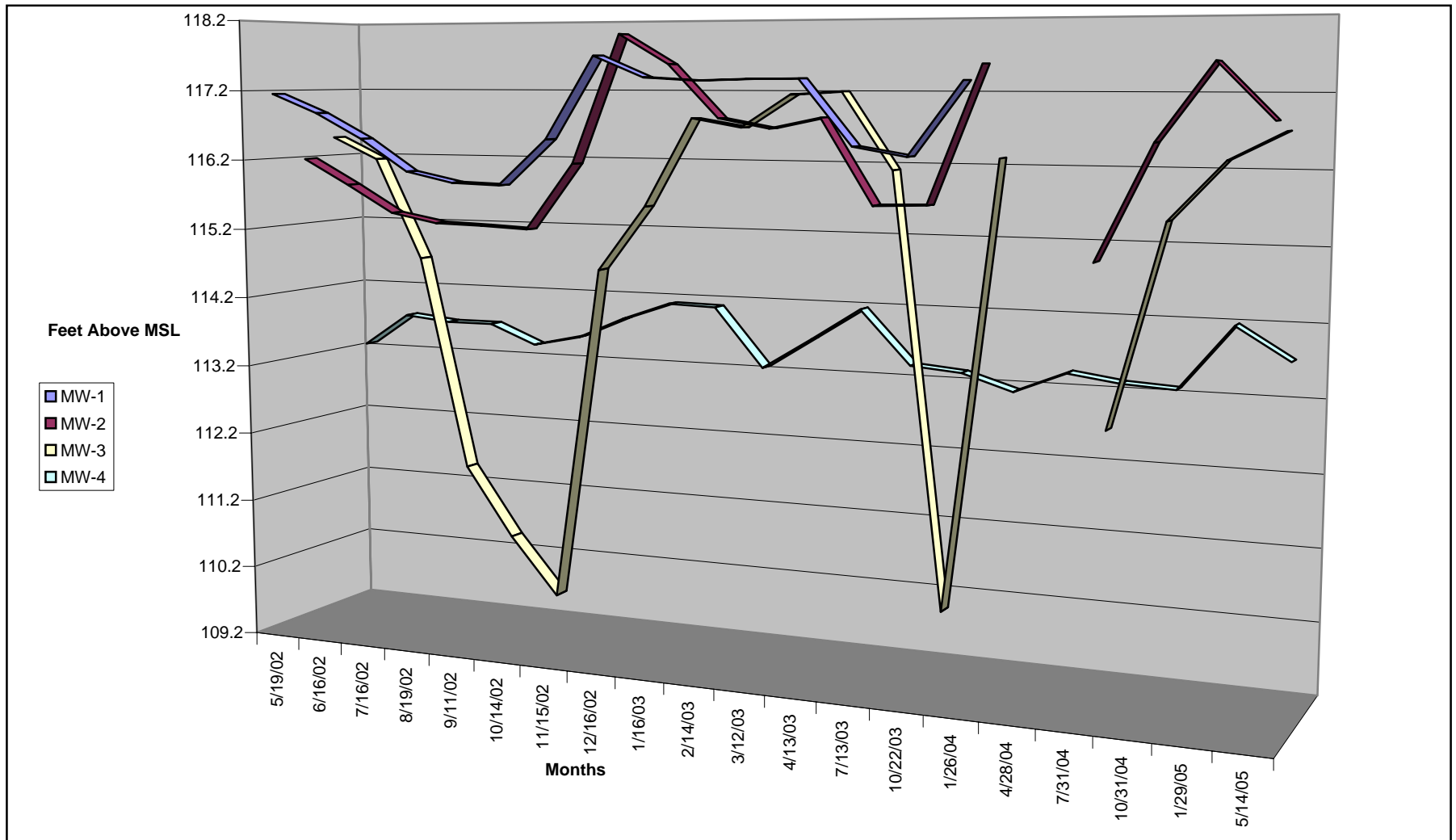
**Notes:**

TPHg: Total petroleum hydrocarbons as gasoline  
MTBE: Methyl tertiary butyl ether  
DIPE: Diisopropyl ether  
TAME: Tertiary amyl methyl ether  
TPHd: Total petroleum hydrocarbons as diesel  
EDB: 1,2-Dibromoethane  
EDC: 1,2-Dichloroethane

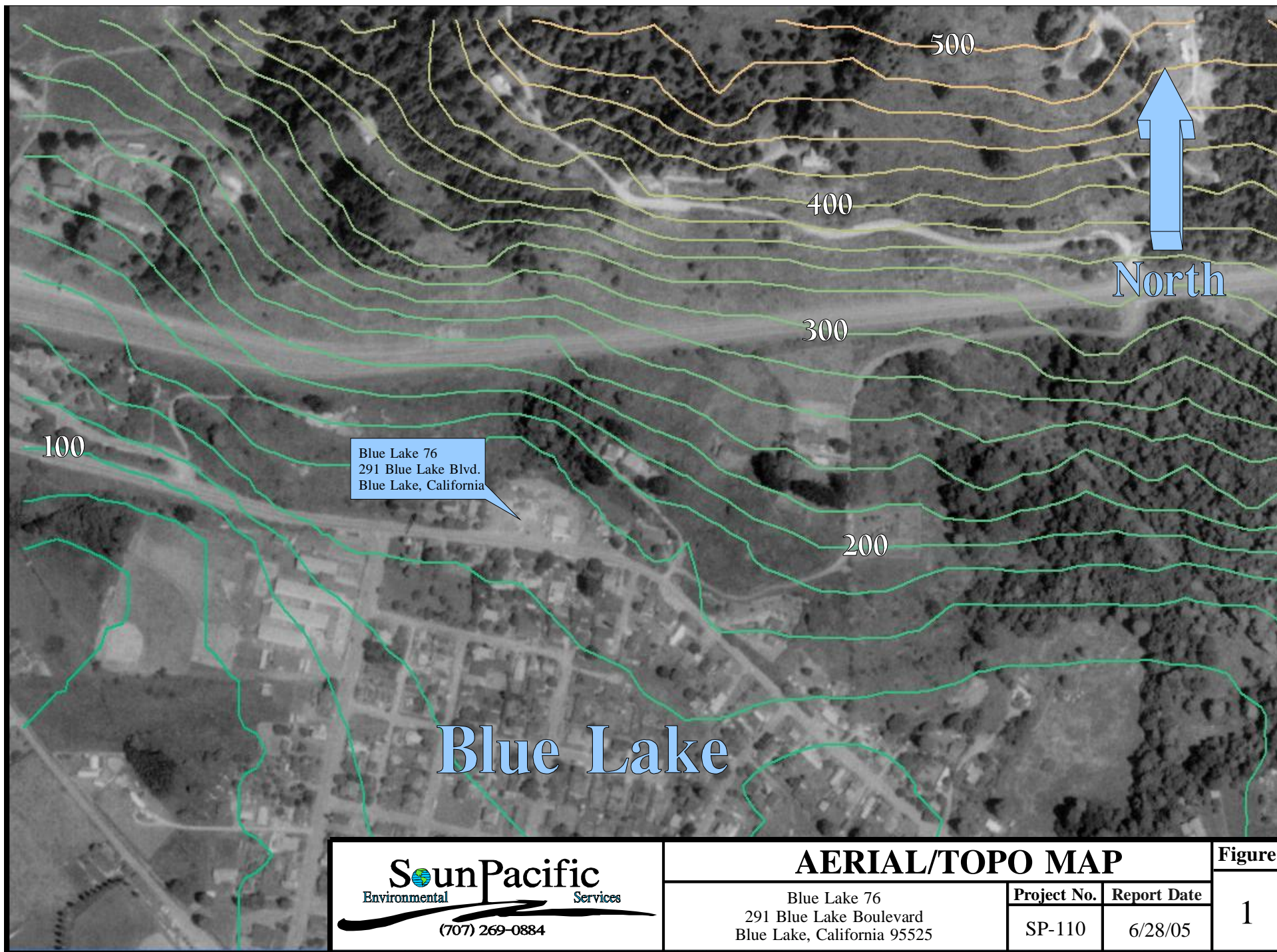
TBA: Tertiary butanol  
ETBE: Ethyl tertiary butyl ether  
TPHmo: Total petroleum hydrocarbons as motor oil  
ppb: parts per billion = µg/l = .001 mg/l = 0.001 ppm  
ND: Not detected. Sample was detected at or below the method detection limit as shown.  
NT: Not tested.

# Chart 1 Hydrograph

Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525



# Figures

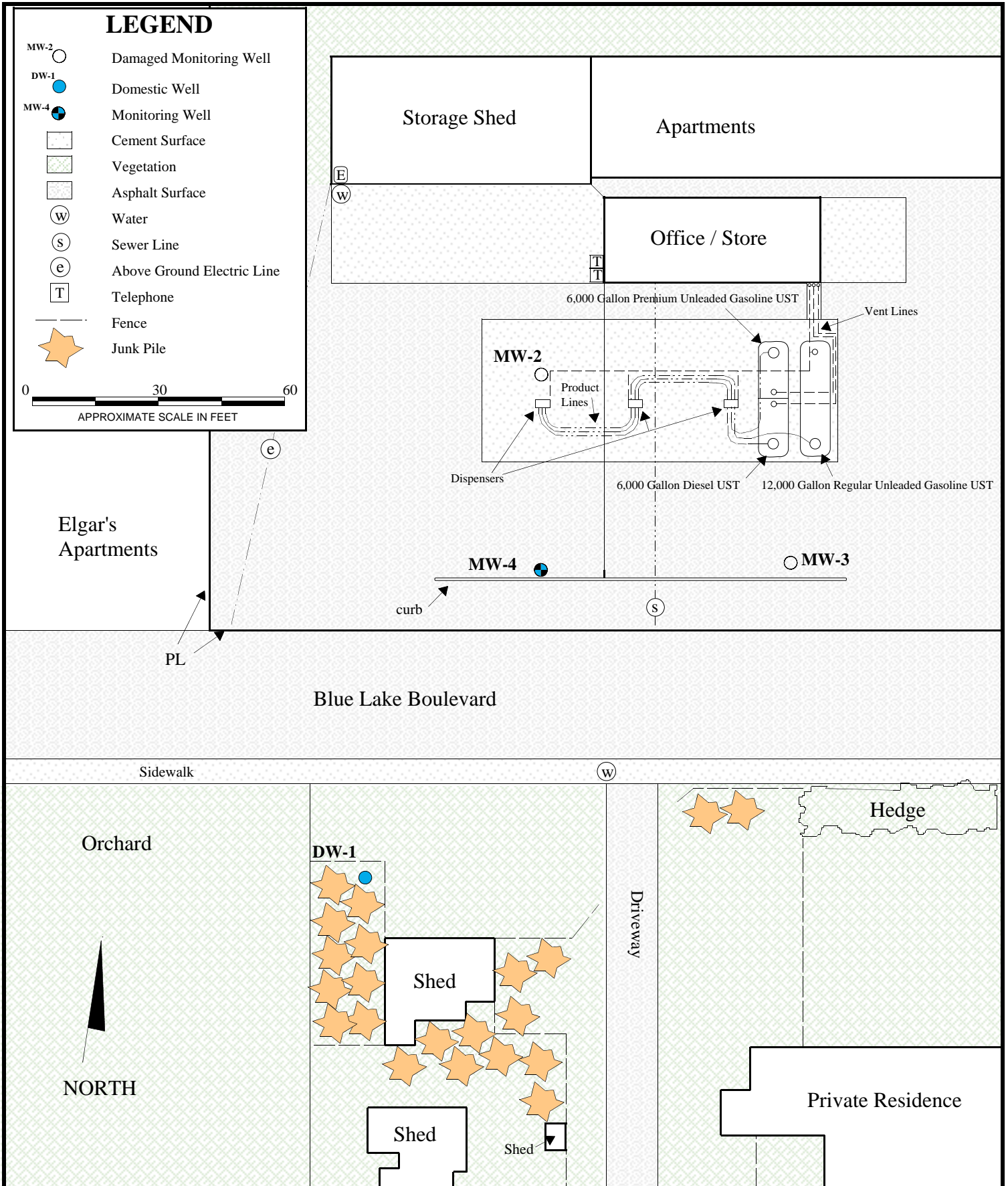


	<b>AERIAL/TOPO MAP</b>		<b>Figure</b>
	Blue Lake 76 291 Blue Lake Boulevard Blue Lake, California 95525	<b>Project No.</b>	
		SP-110	<b>Report Date</b> 6/28/05
			1

# LEGEND

- MW-2 ○ Damaged Monitoring Well
- DW-1 ● Domestic Well
- MW-4 ● Monitoring Well
- Cement Surface
- ▨ Vegetation
- ▨ Asphalt Surface
- W Water
- S Sewer Line
- e Above Ground Electric Line
- T Telephone
- Fence
- ★ Junk Pile

0 30 60  
APPROXIMATE SCALE IN FEET



## SITE PLAN

Figure

Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

Project No.  
SP-110

Report Date  
6/28/05

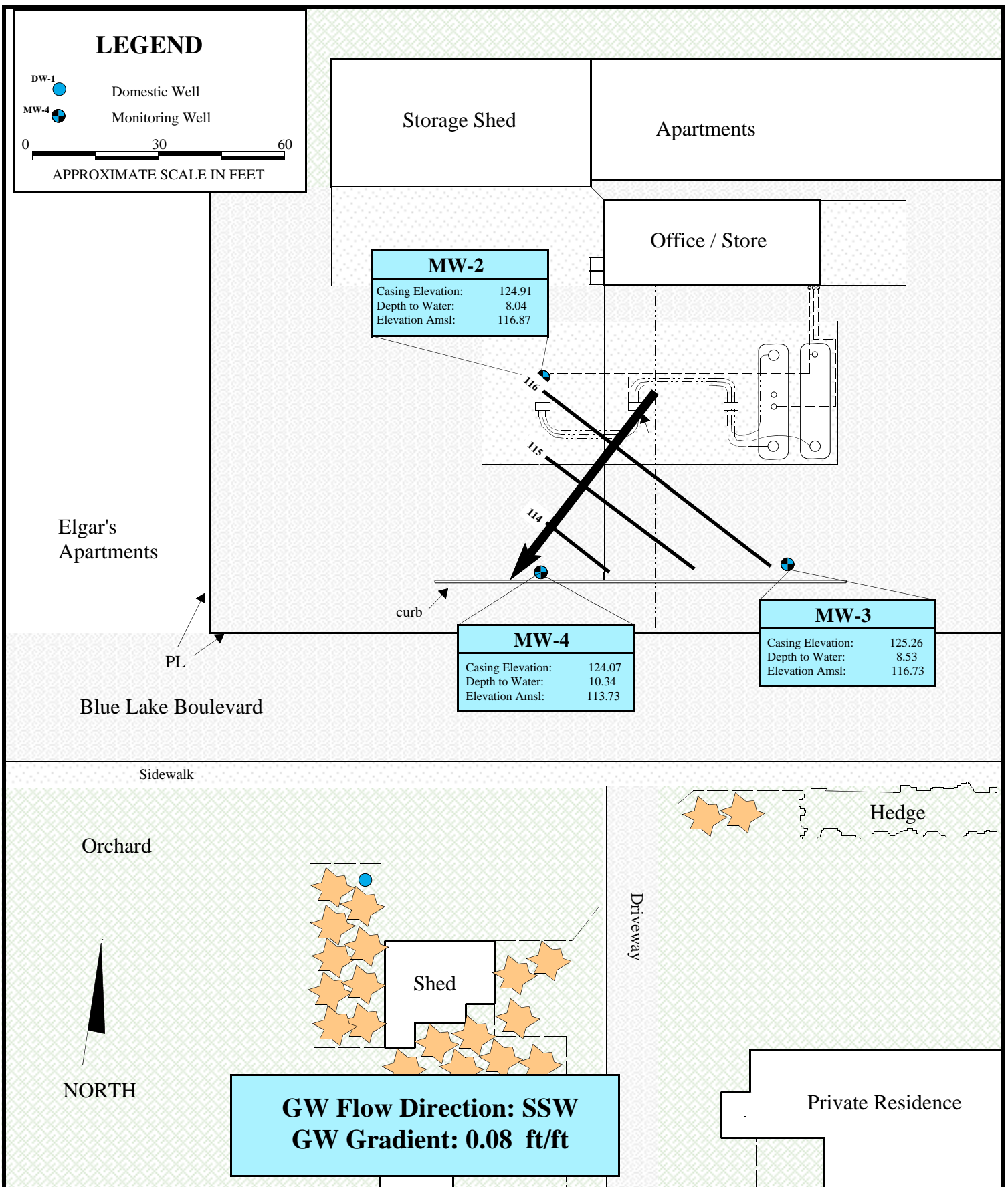
2

Environmental Services

# LEGEND

- DW-1 Domestic Well
- MW-4 Monitoring Well

0 30 60  
APPROXIMATE SCALE IN FEET



**GW Flow Direction: SSW**  
**GW Gradient: 0.08 ft/ft**

## GROUNDWATER LEVEL CONTOUR MAP MAY 2005

Figure

Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

Project No.  
SP-110

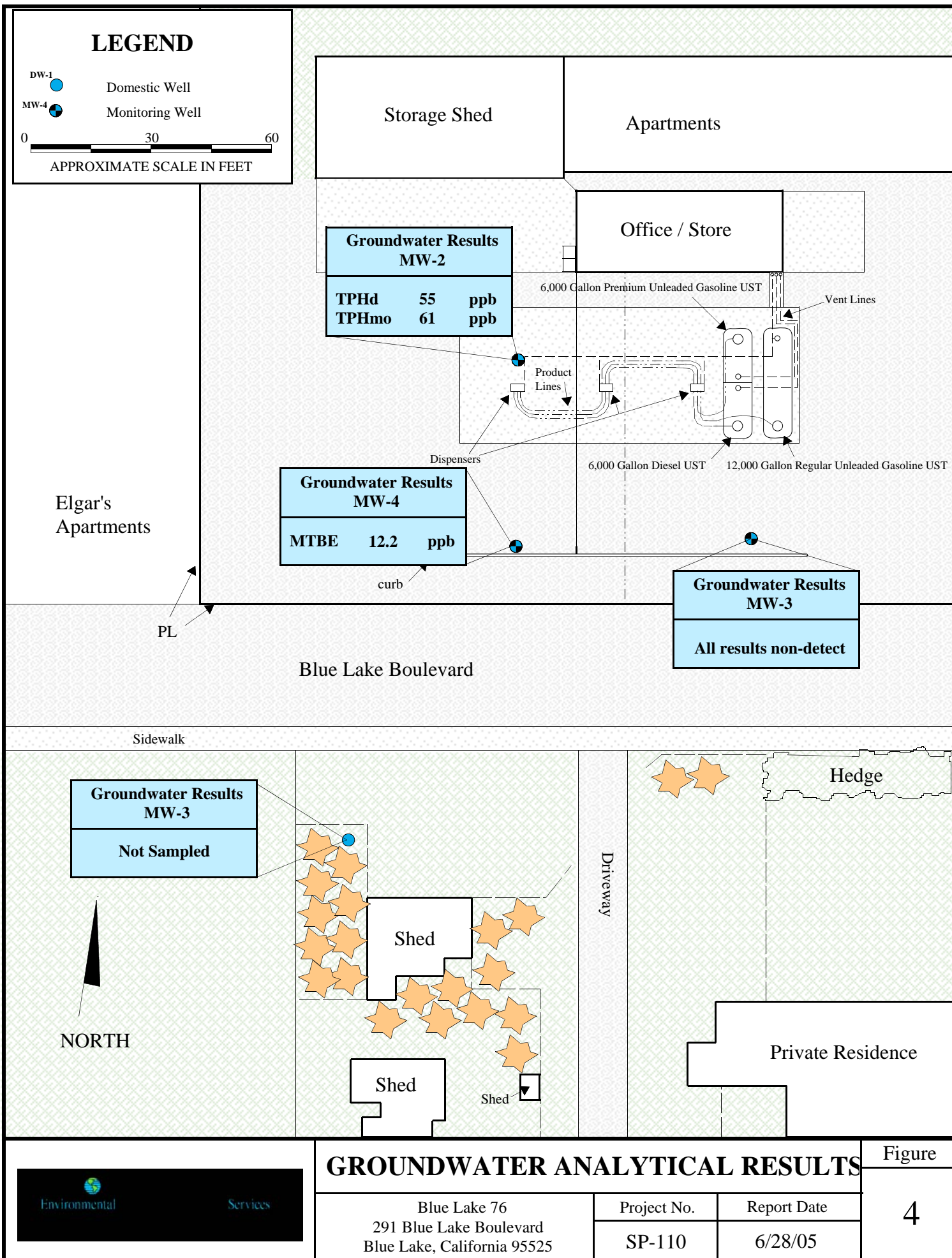
Project Date  
6/28/05

3

# LEGEND

- DW-1 Domestic Well
- MW-4 Monitoring Well

0 30 60  
APPROXIMATE SCALE IN FEET



## GROUNDWATER ANALYTICAL RESULTS

Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

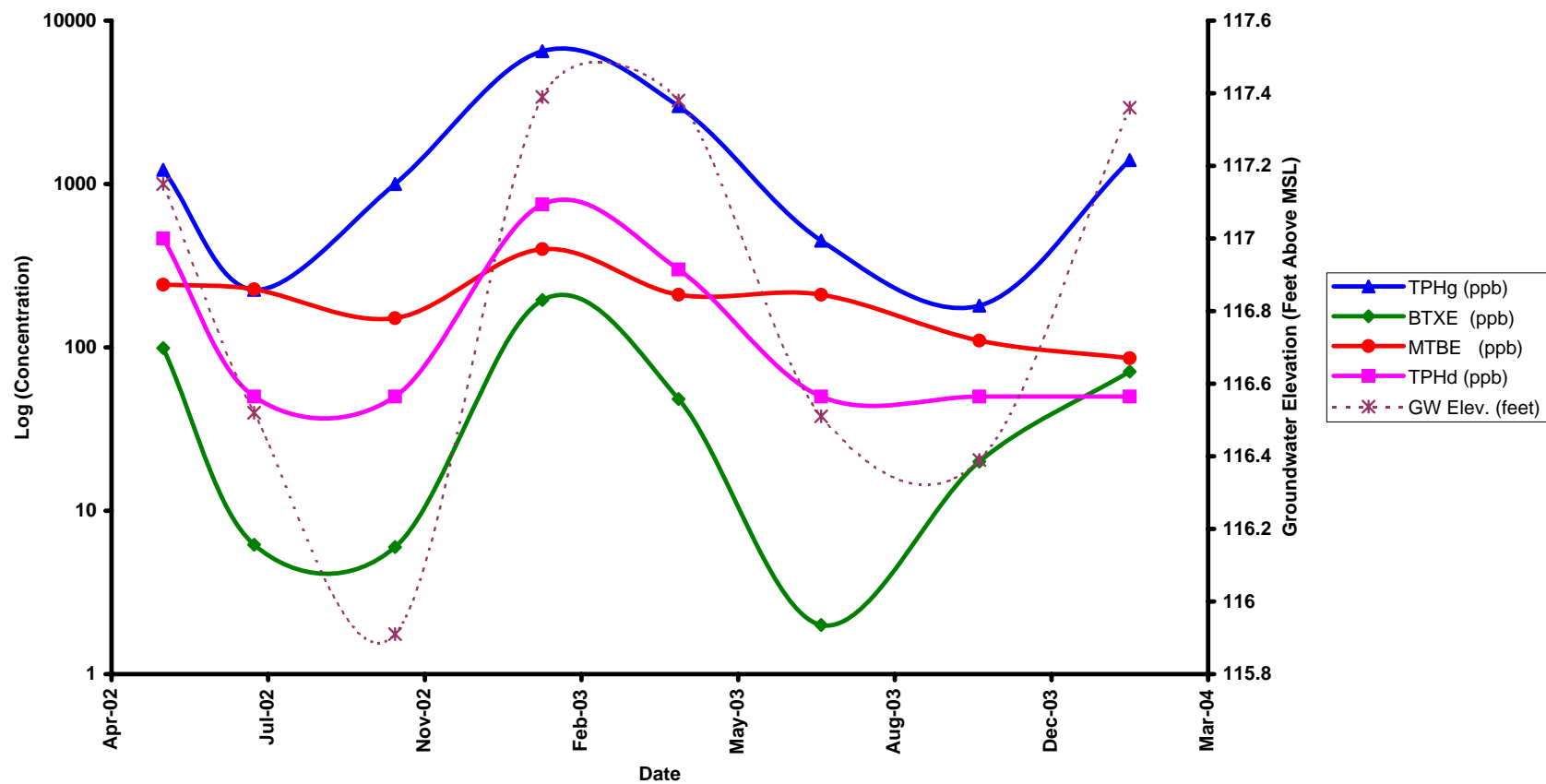
Project No.  
SP-110

Report Date  
6/28/05

Figure

4

Environmental Services



**SounPacific**  
 Environmental Services  
 (707) 269-0884

### MW-1 HYDROCARBON CONCENTRATIONS VS. TIME

Blue Lake 76  
 291 Blue Lake Boulevard  
 Blue Lake, California 95525

Project No.

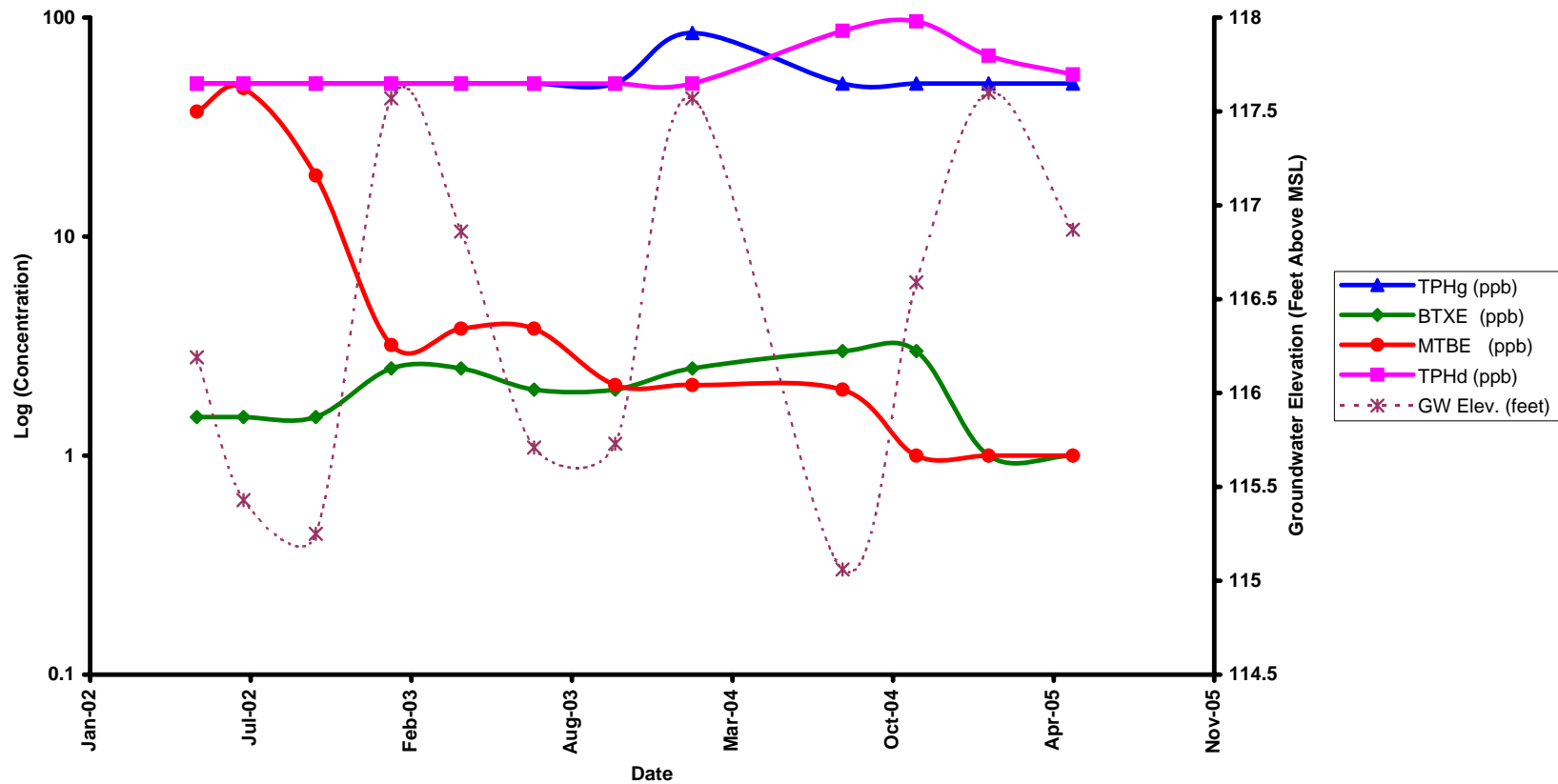
SP-110

Date

6/28/2005

Figure

5



### MW-2 HYDROCARBON CONCENTRATIONS VS. TIME

Blue Lake 76  
291 Blue Lake Boulevard  
Blue Lake, California 95525

Project No.

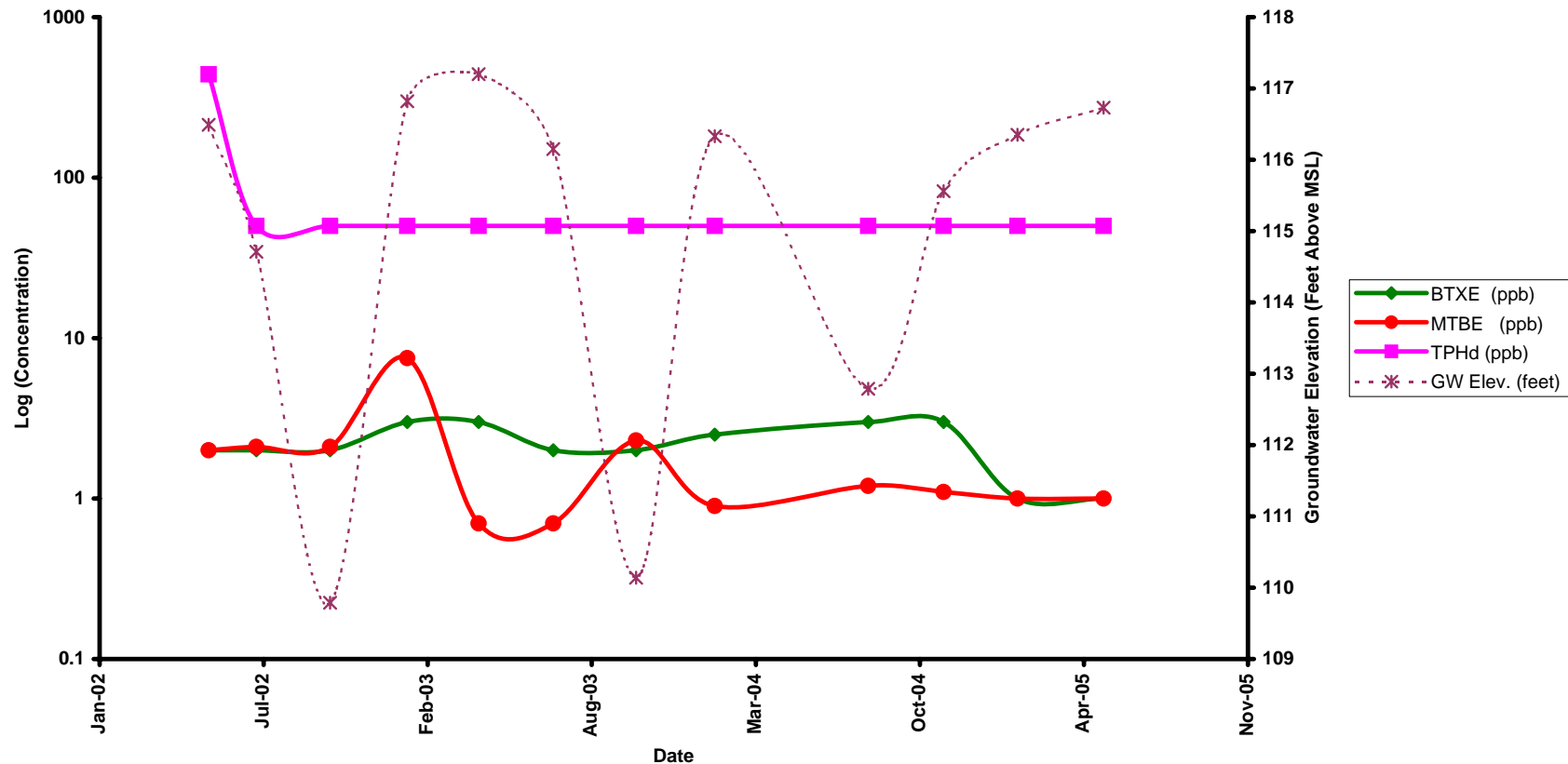
SP-110

Date

6/28/2005

Figure

6



**SounPacific**  
 Environmental Services  
 (707) 269-0884

### MW-3 HYDROCARBON CONCENTRATIONS VS. TIME

Blue Lake 76  
 291 Blue Lake Boulevard  
 Blue Lake, California 95525

Project No.

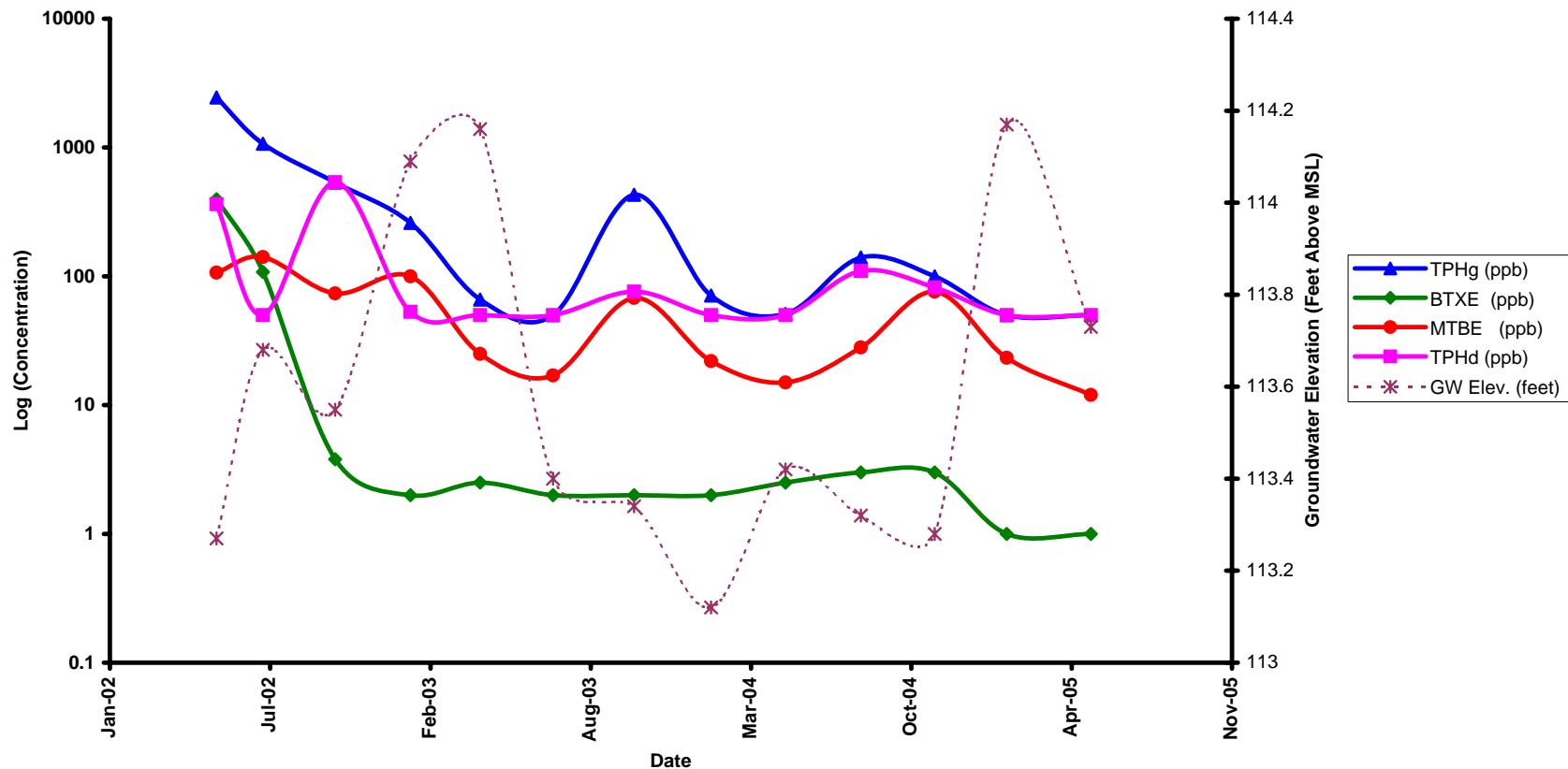
SP-110

Date

6/28/2005

Figure

7



**SounPacific**  
 Environmental Services  
 (707) 269-0884

### MW-4 HYDROCARBON CONCENTRATIONS VS. TIME

Blue Lake 76  
 291 Blue Lake Boulevard  
 Blue Lake, California 95525

Project No.

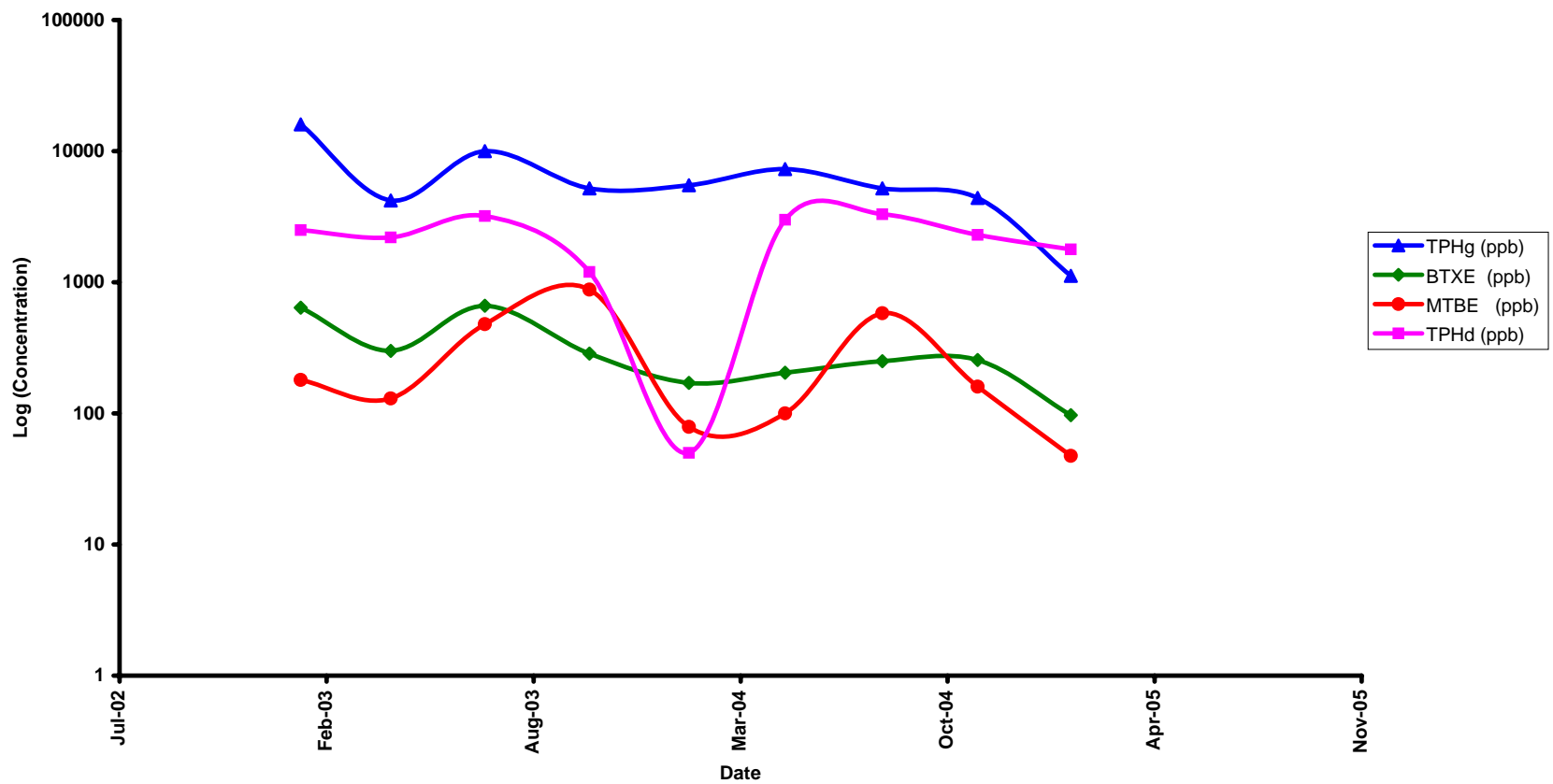
SP-110

Date

6/28/2005

Figure

8



### DW-1 HYDROCARBON CONCENTRATIONS VS. TIME

Blue Lake 76  
 291 Blue Lake Boulevard  
 Blue Lake, California 95525

Project No.

SP-110

Date

6/28/2005

Figure

9

# Appendices

# Appendix A

June 01, 2005

**Lab ID: 5050770**

Andy Malone  
SOUNPACIFIC  
4612 GREENWOOD HEIGHTS DR  
KNEELAND, CA 95549  
RE: BLUE LAKE 76 SP-110

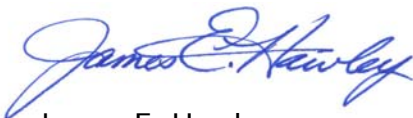
Dear Andy Malone,

Enclosed are the analysis results for Work Order number 5050770. All analysis were performed under strict adherence to our established Quality Assurance Plan. Any abnormalities are listed in the qualifier section of this report.

If you have any questions regarding these results, please feel free to contact us at any time. We appreciate the opportunity to service your environmental testing needs.

Sincerely,

For



James E. Hawley  
Laboratory Director

California ELAP Certification Number 1677

Report To: SOUNPACIFIC  
4612 GREENWOOD HEIGHTS DR  
KNEELAND, CA 95549  
Attention: Andy Malone  
Project: BLUE LAKE 76 SP-110

Lab No: 5050770  
Reported: 05/31/05  
Phone: 707-269-0884  
P.O. #

Description: MW-2  
Matrix: Water  
Lab ID: 5050770-01

Sampled: 05/14/05 00:00  
Received: 05/18/05 10:58

## Volatile Organic Compounds

Analyte	Units	Results	Qualifier	MDL	RL	Method	Analyzed	Prepared	Batch
Gasoline	ug/l	ND			50.0	EPA 8015/8260	05/18/05	05/18/05	B5E0454
Benzene	"	ND			0.5	"	"	"	"
Ethylbenzene	"	ND			0.5	"	"	"	"
Toluene	"	ND			0.5	"	"	"	"
Xylenes (total)	"	ND			1.0	"	"	"	"
Methyl tert-butyl ether	"	ND			1.0	"	"	"	"
Di-isopropyl ether	"	ND			0.5	"	"	"	"
Tert-amyl methyl ether	"	ND			0.5	"	"	"	"
Ethyl tert-butyl ether	"	ND			0.5	"	"	"	"
Tert-butyl alcohol	"	ND			50.0	"	"	"	"
Surrogate: 4-Bromofluorobenzene		93.2 %			43-155	"	"	"	"

## TPH Diesel & Motor Oil

Analyte	Units	Results	Qualifier	MDL	RL	Method	Analyzed	Prepared	Batch
Diesel	ug/l	55	D-02		50	EPA 8015 MOD	05/24/05	05/20/05	B5E0493
Motor Oil	"	61			50	"	"	"	"
Surrogate: Octacosane		110 %			50-150	"	"	"	"

Approved By

Basic Laboratory, Inc.

California D.O.H.S. Cert #1677

**Report To:** SOUNPACIFIC  
4612 GREENWOOD HEIGHTS DR  
KNEELAND, CA 95549

**Attention:** Andy Malone  
**Project:** BLUE LAKE 76 SP-110

**Description:** MW-3

**Matrix:** Water

**Lab ID:** 5050770-02

**Lab No:** 5050770  
**Reported:** 05/31/05  
**Phone:** 707-269-0884  
**P.O. #**

**Sampled:** 05/14/05 00:00

**Received:** 05/18/05 10:58

## Volatile Organic Compounds

<u>Analyte</u>	<u>Units</u>	<u>Results</u>	<u>Qualifier</u>	<u>MDL</u>	<u>RL</u>	<u>Method</u>	<u>Analyzed</u>	<u>Prepared</u>	<u>Batch</u>
Gasoline	ug/l	ND			50.0	EPA 8015/8260	05/18/05	05/18/05	B5E0454
Benzene	"	ND			0.5	"	"	"	"
Ethylbenzene	"	ND			0.5	"	"	"	"
Toluene	"	ND			0.5	"	"	"	"
Xylenes (total)	"	ND			1.0	"	"	"	"
Methyl tert-butyl ether	"	ND			1.0	"	"	"	"
Di-isopropyl ether	"	ND			0.5	"	"	"	"
Tert-amyl methyl ether	"	ND			0.5	"	"	"	"
Ethyl tert-butyl ether	"	ND			0.5	"	"	"	"
Tert-butyl alcohol	"	ND			50.0	"	"	"	"
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>94.0 %</i>			<i>43-155</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>

## TPH Diesel & Motor Oil

<u>Analyte</u>	<u>Units</u>	<u>Results</u>	<u>Qualifier</u>	<u>MDL</u>	<u>RL</u>	<u>Method</u>	<u>Analyzed</u>	<u>Prepared</u>	<u>Batch</u>
Diesel	ug/l	ND			50	EPA 8015 MOD	05/24/05	05/20/05	B5E0493
Motor Oil	"	ND			50	"	"	"	"
<i>Surrogate: Octacosane</i>		<i>80.6 %</i>			<i>50-150</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>

Approved By

Basic Laboratory, Inc.

California D.O.H.S. Cert #1677

Report To: SOUNPACIFIC  
4612 GREENWOOD HEIGHTS DR  
KNEELAND, CA 95549

Attention: Andy Malone  
Project: BLUE LAKE 76 SP-110

Description: MW-4

Matrix: Water

Lab ID: 5050770-03

Lab No: 5050770  
Reported: 05/31/05  
Phone: 707-269-0884  
P.O. #

Sampled: 05/14/05 00:00

Received: 05/18/05 10:58

## Volatile Organic Compounds

Analyte	Units	Results	Qualifier	MDL	RL	Method	Analyzed	Prepared	Batch
Gasoline	ug/l	ND			50.0	EPA 8015/8260	05/18/05	05/18/05	B5E0454
Benzene	"	ND			0.5	"	"	"	"
Ethylbenzene	"	ND			0.5	"	"	"	"
Toluene	"	ND			0.5	"	"	"	"
Xylenes (total)	"	ND			1.0	"	"	"	"
Methyl tert-butyl ether	"	12.2			1.0	"	"	"	"
Di-isopropyl ether	"	ND			0.5	"	"	"	"
Tert-amyl methyl ether	"	ND			0.5	"	"	"	"
Ethyl tert-butyl ether	"	ND			0.5	"	"	"	"
Tert-butyl alcohol	"	ND			50.0	"	"	"	"
Surrogate: 4-Bromofluorobenzene		95.2 %			43-155	"	"	"	"

## TPH Diesel & Motor Oil

Analyte	Units	Results	Qualifier	MDL	RL	Method	Analyzed	Prepared	Batch
Diesel	ug/l	ND			50	EPA 8015 MOD	05/24/05	05/20/05	B5E0493
Motor Oil	"	ND			50	"	"	"	"
Surrogate: Octacosane		105 %			50-150	"	"	"	"

Approved By

Basic Laboratory, Inc.

California D.O.H.S. Cert #1677

**Report To:** SOUNPACIFIC  
4612 GREENWOOD HEIGHTS DR  
KNEELAND, CA 95549  
**Attention:** Andy Malone  
**Project:** BLUE LAKE 76 SP-110

**Lab No:** 5050770  
**Reported:** 05/31/05  
**Phone:** 707-269-0884  
**P.O. #**

### Notes and Definitions

D-02	Hydrocarbon pattern present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration (CLP J-Flag). The J flag is equivalent to the DNQ Estimated Concentration flag.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
<	Less than reporting limit
≤	Less than or equal to reporting limit
>	Greater than reporting limit
≥	Greater than or equal to reporting limit
MDL	Method Detection Limit
RL/ML	Minimum Level of Quantitation
MCL/AL	Maximum Contaminant Level/Action Level
mg/kg	Results reported as wet weight
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristic Leachate Procedure

---

Approved By

Basic Laboratory, Inc.

California D.O.H.S. Cert #1677

2218 Railroad Avenue, Redding, CA 96001 (530) 243-7234 FAX 243-7494

NAME: <u>San Pacific</u>				PROJECT NAME: <u>Blue Lake 76</u>				PROJECT #: <u>SP-110</u>				LAB #: <u>5050770</u>							
ADDRESS: <u>P.O. Box 13</u> <u>Kneeland, CA 95549</u>				REQUESTED COMP. DATE: <u>Standard 6/1/05</u>				# SAMP: <u>3</u>				PAGE <u>1</u> OF <u>1</u>							
PROJECT MANAGER: <u>Andy Malone</u>				TURN AROUND TIME: STD <input checked="" type="checkbox"/> RUSH <input type="checkbox"/>				ANALYSES REQUESTED				REP: <u>TECHNICAL SERVICES</u>							
PHONE: <u>707-269-0888</u>		FAX: <u>707-269-0697</u>		E-MAIL: <u>andy@sanpacific.com</u>		INVOICE TO: <u>San Pacific</u>		PO#: <u>SP-110</u>		CUST. SEAL		ICE		QC = 1 2 3 4					
SPECIAL MAIL <input type="checkbox"/>		E-MAIL <input checked="" type="checkbox"/>		FAX <input type="checkbox"/>															
DATE	TIME	WATER	COMP	SOIL	SAMPLE DESCRIPTION				# OF BOTTLES					LAB ID	REMARKS				
5-14-05		X			Quarterly Groundwater Monitoring				2	3	X	X		1					
					MW-2									2					
					MW-3									3					
					MW-4														
PRESERVATIONS HNO3 <input type="checkbox"/> H2SO4 <input type="checkbox"/> NaOH <input type="checkbox"/> ZnAc2/NaOH <input type="checkbox"/> HCL <input checked="" type="checkbox"/> Nathio <input type="checkbox"/>																			
SAMPLED BY: <u>Tien-an Lai</u>					DATE/TIME: <u>5-14-05</u>					RELINQUISHED BY: <u>[Signature]</u>					DATE/TIME: <u>5-16-05</u>				
ED BY:					DATE/TIME:					RELINQUISHED BY:					DATE/TIME:				
RECEIVED BY:					DATE/TIME:					RELINQUISHED BY:					DATE/TIME:				
RECEIVED BY LAB: <u>[Signature]</u>					DATE/TIME: <u>5/18/05 10:58</u>					SAMPLE SHIPPED VIA: UPS POST BUS FED-EX OTHER									
INSTRUCTIONS, TERMS, CONDITIONS ON BACK.																			

## **Appendix B**



# Standard Operating Procedures

## Monitoring Well Purging and Groundwater Sampling

All SounPacific employees and contractors shall adopt the following procedures any time that groundwater samples are to be taken from an existing groundwater monitoring well.

Prior to the implementation of these procedures, the groundwater level **MUST** be measured and the presence of free phase hydrocarbons determined in accordance with SounPacific's Standard Operating Procedures for Groundwater Level Measurements and Free Phase Hydrocarbon Measurements.

### Equipment Checklist

- ☐ **Gauging Data / Purge Calculations Sheet used for water level determination**
- ☐ Chain of Custody Form
- ☐ pH/ Conductivity / Temperature meter
- ☐ Pencil or Pen
- ☐ Indelible Marker
- ☐ Calculator
- ☐ Disposable Gloves
- ☐ Distilled Water
- ☐ Alconox/liquinox liquid or powdered non-phosphate cleaner
- ☐ Buckets or Tubs for decontamination station
- ☐ Bottom-filling bailer or pumping device for purging
- ☐ Disposable bottom-filling bailer and emptying device for sampling
- ☐ String, twine or fishing line for bailers
- ☐ Sample containers appropriate for intended analytical method (check with lab)
- ☐ Sample labels
- ☐ Site Safety Plan
- ☐ Tools necessary to access wells
- ☐ Drum space on site adequate for sampling event

### **Procedure**

1. Review Site Safety Plan and utilize personal protection appropriate for the contaminants that may be encountered.
2. Measure groundwater levels and check for the presence of free product in accordance with the Standard Operating Procedures for Groundwater Level Measurements and Free Phase Hydrocarbon Measurements.

### **Purging**

3. Calculate and record the volume of standing water in each well using the information provided on the Gauging Data / Purge Calculations sheet.  
 $(DTB-DTW) \times \text{Conversion Factor} = \text{Casing Volume}$ .
4. The purge volume shall be at least three times and no more than seven times the volume of standing water (the casing volume).
5. Purge the well by bailing or pumping water from the well into a calibrated receptacle, such as a five gallon bucket or tub with markings to indicate one gallon increments. Collect purgeate in a 55 gallon labeled drum and store on site. Drum labels should include the date, contents, site number, and SounPacific's name and telephone number.
6. Take measurements of pH, conductivity, temperature, and visual observations to verify the stabilization of these parameters. At least five measurements of these parameters should be made throughout the purging process. The parameters shall be considered stabilized if successive measurements vary by less than 0.25 pH units, 10% of conductivity in  $\mu\text{S}$ , and  $1^{\circ}\text{C}$  (or  $1.8^{\circ}\text{F}$ ). Continue purging until at least three times the casing volume has been removed, and the measured parameters have stabilized as indicated above. Do not exceed seven casing volumes.
7. Take a final depth to groundwater measurement and calculate the casing volume of the recharged well. Ideally, the casing volume should have recharged to at least 80% of the original measured casing volume before sampling commences. If due to slow recharge rates it is not feasible to wait for the well to fully recharge, then note this on the Gauging Data / Purge Calculation Sheet and proceed to sample following the procedure below.

## **Sampling**

8. **After completing groundwater measurement, and checking for free product if necessary, in accordance with SounPacific's Standard Operating Procedures for Groundwater Level Measurements and Free Phase Hydrocarbon Measurements, and after purging monitoring wells as described above, groundwater samples may be collected.**
9. Slowly lower a clean, previously unused disposable bailer into the well water approximately half of the bailer length, and allow the bailer to slowly fill.
10. Withdraw the full bailer from the monitoring well and utilize the included (clean and unused) bottom-emptying device to fill the necessary sample containers, and seal the container with the included PTFE (Teflon) lined cap.
11. When filling VOAs, fill the VOA completely full, with the meniscus rising above the rim of the bottle. Carefully cap the VOA and invert it and gently tap it to determine whether air bubbles are trapped inside. If the VOA contains air bubbles, refill the VOA and repeat this step.
12. All samples shall be labeled with the Sample ID, the Sample Date, and the Sample Location or Project Number. Use an indelible marker for writing on sample labels.
13. Record all pertinent sample data on the Chain of Custody.
14. Place samples in an ice chest cooled to 4°C with ice or "blue ice". Bottles should be wrapped in bubble wrap, and VOA's should be inserted in a foam VOA holder to protect against breakage. Samples are to be kept at 4°C until delivered to the laboratory. Any transference of sample custody shall be indicated on the Chain of Custody with the appropriate signatures as necessary.
15. Utilize clean, previously unused gloves, bailer and line, and bottom-emptying device for each well sampled.
16. When finished with all sampling, close and secure all monitoring wells.
17. Leave the site cleaner than when you arrived and drive safely.



## **Standard Operating Procedures**

### **Groundwater Level Measurements and Free Phase Hydrocarbon Measurements**

All SounPacific staff and contractors shall adopt the following procedures any time that groundwater elevations are determined for the purposes of establishing groundwater gradient and direction, and prior to any sampling event.

Wells are to be tested for free phase hydrocarbons (free product) before the first development or sampling of any new well, and in any well that has historically contained free product.

#### **Equipment Checklist**

- ☐ Combination water level / free phase hydrocarbon indicator probe (probe)
- ☐ Gauging Data / Purge Calculations Sheet
- ☐ Pencil or Pen/sharpie
- ☐ Disposable Gloves
- ☐ Distilled Water and or know water source on site that is clean
- ☐ Alconox (powder) or Liquinox (liquid) non-phosphate cleaners—do not use soap!
- ☐ Buckets or Tubs for decontamination station
- ☐ Tools necessary to access wells
- ☐ Site Safety Plan
- ☐ This Standard Operating Procedure
- ☐ Notify Job site business that you will be arriving to conduct work.

#### **Procedure**

1. Review Site Safety Plan and utilize personal protection appropriate for the contaminants that may be encountered.
2. Access and open all monitoring wells to be measured. Allow wells to equilibrate for approximately 15 minutes before taking any measurements.

3. Decontaminate probe with Alconox or Liquinox solution, and rinse with distilled water.
4. Determine the diameter of the well to be measured and indicate this on the Gauging Data / Purge Calculations Sheet.
5. Words of caution: Please be careful with water level and product meters probes are not attached with high strength material so please make sure to avoid catching the end on anything in the well and make sure not to wind reel to the point that it could pull on the probe. ***If product is suspect in a well, go to step 6, if no product is suspected go to step 7 below.***
6. **When product is present or suspected:** use the product level meter. Clip the static charge clamp to the side of the well casing. Then lower probe into the well through the product/water interface about one foot if possible. Then slowly raise the probe back up through the product/water interface layer and record the level as the tone changes from solid to broken-record this level in the Gauging Data / Purge Calculations Sheet to the nearest 0.01 foot (DTP). Continue to raise the probe up through the product until the tone stops completely-record this level on the Gauging Data / Purge Calculations Sheet to the nearest 0.01 foot (DTW). Then go to step 8.
7. **When no product is present or suspected:** If no free product is present, record the depth of the water (to the nearest 0.01 foot) relative to the painted black mark on the top of the well casing. Leave the probe in the well just a hair above the water level to ensure the well as equilibrated. As the well rises, the tone will sound. Make sure no increase in water levels have occurred in over a ten-minute period. Water levels can lower as well as rise. Make sure you note when the level you keep lowering the probe to has remained stable for at least ten minutes. Once this has been accomplished, please record this level in the Gauging Data / Purge Calculations Sheet to the nearest 0.01 foot (DTW).
8. Turn off the probe, and use the probe to determine the depth to the bottom of the well relative to the top of the well casing. This is the depth to bottom measurement (DTB).
9. Decontaminate probe and tape by washing in an Alconox/Liquinox solution (***read directions on solution for ratio of water to cleanser***) and use the toothbrush provided to remove any foreign substance from the probe and tape. Then triple rinse probe and tape with clean water and then proceed to take measurements in the next well.
10. If sampling is to occur, proceed to implement SounPacific's Standard Operating Procedure for Monitoring Well Purging and Sampling. If no sampling is to be performed, close and secure all wells and caps.

# Appendix C

## GAUGING DATA/PURGE CALCULATIONS

Job Site: Blue Lake 76Job No.: 57-110Event: Quarterly SamplingDate: 5-14-05

**Soun Pacific**  
Environmental Services  
(707) 269-0884

WELL NO.	DIA. (in.)	DTB (ft.)	DTW (ft.)	ST (ft.)	CV (gal.)	PV (gal.)	SPL (ft.)	Bailer Loads	Notes
MW-2	2	18.16	8.04	10.12	1.62	4.86			
MW-3	2	19.25	8.53	10.76	1.72	5.15			MW-3 took a long time to stabilize.
MW-4	2	19.43	10.34	9.09	1.45	4.35			MW-4 took a long time to stabilize

## Explanation:

DIA. = Well Diameter

DTB = Depth to Bottom

DTW = Depth to Water

ST = Saturated Thickness (DTB-DTW)

CV = Casing Volume (ST x cf)

PV = Purge Volume (standard 3 x CV,  
well development 10 x CV)

SPL = Thickness of Separate Phase Liquid

## Conversion Factors (cf):

2 in. dia. well cf = 0.16 gal./ft.

4 in. dia. well cf = 0.65 gal./ft.

6 in. dia. well cf = 1.44 gal./ft.

Sampler:

Tien-yu Tu.

RECEIVED  
5/15/05

## Well Gauging/Sampling Report

Sheet 1 of 3

Date: 5-14-05 Project Name: Blue Lake 76 Project No: SP-110 Well Number: MW-2

Analyses Tested: TPHg, TP Hd, TP Hwa, BTXE, 5 Oxy's

Sample Containers: 3 Hie VOAs, 2 1-L Bottles

Purge Technique: ☐ Bailor ☒ Pump

Sounder Used: ☐ Water Meter ☒ Interface Meter

### Water & Free Product Levels

Time	Depth to Water	Depth to Product	Notes
11.43 a	7.92		No Sheen ↓
12.18 p.	8.20		
12.48	8.04		
1.11	8.04		
End			

### Field Measurements

Time	Total Vol. Removed/(gal)	pH	Temp/(F)	Cond./(ms/cm)	DO/(mg/L)	DO/(%)	
4.00 p	0	7.16	59.55	0.155	0.29	2.9	
4.04	1.6	7.07	58.83	0.156	0.33	3.3	
4.08	3.2	7.02	58.90	0.154	0.31	3.1	
4.10	4.8	7.03	59.02	0.151	0.43	4.3	

Field Scientist: Tien-yu Tai

## Well Gauging/Sampling Report

Sheet 2 of 3

Date: 3-14-05 Project Name: Blue Lake 76 Project No: SP-110 Well Number: 11W-3

Analyses Tested: TRHg, TPd, TPdno, BTxE, 5 Oxy.

Sample Containers: 3 HCl VOA's, 2 HL Bottles

Purge Technique: ☐ Bailor ☒ Pump

Sounder Used: ☐ Water Meter ☒ Interface Meter

### Water & Free Product Levels

Time	Depth to Water	Depth to Product	Notes
11:48a	8.94		No sheen
12:21p	8.74		No sheen
12:53p	8.65		No sheen
1:19p	8.59		Sheen
1:36p	8.57		Sheen
1:54p	8.53		Sheen

### Field Measurements

Time	Total Vol. Removed(gal)	pH	Temp(F)	Cond. (ns/cm)	DO (mg/L)	DO (%)	
2:41p	0	7.23	59.95	0.219	0.41	4.1	
2:47	1.75	7.12	60.04	0.220	0.41	4.1	
2:51	3.5	7.03	60.01	0.229	0.43	4.3	
2:54	5.25	7.01	60.25	0.221	0.54	5.4	

Field Scientist: Tien-yu Tai

## Well Gauging/Sampling Report

Sheet 3 of 3

Date: 3-14-05 Project Name: Blue Lake 76 Project No: SP-110 Well Number: MW-4

Analyses Tested: TPH<sub>g</sub>, TPH<sub>L</sub>, TPH<sub>mic</sub>, BTXE, 5 Oxy's

Sample Containers: 3 100 VOCs, 2 1-L Baffles

Purge Technique: ☐ Bailor ☒ Pump

Sounder Used: ☐ Water Meter ☒ Interface Meter

### Water & Free Product Levels

Time	Depth to Water	Depth to Product	Notes
11:54a	10.91 ft		Shoen
12:29p	10.66		Shoen
12:57	10.56		No Shoen
1:34	10.46		No Shoen
1:42	10.41		No Shoen
2:00	10.35		No Shoen

### Field Measurements

Time	Total Vol. Removed (gal)	pH	Temp (F)	Cond. (ns/cm)	DO (mg/L)	DO (%)	
3:23	0	6.93	61.91	0.610	0.48	5.0	
3:26	1.5	6.89	61.79	0.575	0.47	4.9	
3:30	3.0	6.89	61.90	0.581	0.39	4.0	
3:33	4.5	6.95	62.18	0.596	0.54	5.6	

Field Scientist: Tien-yu Tai